

REMARKS

Reconsideration and withdrawal of all grounds of rejection in the Office Action are respectfully requested. Claims 1-7 remain pending in this application. Claim 2 has been amended. Favorable reconsideration is respectfully requested for the reasons indicated hereinbelow.

Summary of the Rejections:

(1) Claim 2 stands rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite.

(2) Claims 1,2 5 and 6 stand rejected under 35 U.S.C. §103(a) as allegedly being obvious over Uno et al. (JP 6-342052, hereafter "Uno") in view of Radic et al. (*25 GHz Interleaved Bidirectional Transmission Over Non-Zero Dispersion Shifted Fiber*, by S. Radic, S. Chandrasekhar, A Srivastava, H. Kim, L. Nelson, S. Liang, K. Tai and N. Copner, hereafter "Radic", March 17, 2001).

(3) Claims 3, 4 and 7 stand rejected under 35 U.S.C. §103(a) as allegedly being obvious over Uno in view of Radic as applied to claims 1, 2 and 6, and further in view of admitted prior art.

Examiner's Opinion:**I. 35 U.S.C. §112:**

The Examiner alleges that the terminals in claim 2 are not in agreement with the terminals recited in claim 1.

II. 35 U.S.C. §103(a) rejection of claims 1, 2, 5 and 6:

The Examiner alleges that claims 1, 2, 5 and 6 would have been obvious to a person of ordinary skill in the art over the disclosure of Uno in view of Radic.

According to the Examiner, Uno discloses:

- (1) a first wavelength routing element (26) that combines wavelengths at a first and second terminal and outputs a combine signal at a third terminal;
- (2) an optical fiber amplifier (10);
- (3) a second wavelength routing element (36) that splits the amplified signal at the third terminal into the forward and reverse optical signals.

However, the Examiner acknowledges that Uno fails to disclose or suggest the interleaving of forward and reverse propagating signals. Thus, the Examiner cites the disclosure by Radic as disclosing port interleavers and alleges that the instant claims would have been obvious in view of the combination of references, because modifying Uno by substituting three port interleavers for the first and second wavelength routing elements is beneficial to reduce four-wave mixing. So long as the Examiner can provide a rational reason for combining the teachings of the references, he may allege the motivation to combine the teachings of the references even if a different motive is the reason for the combination than the present invention.

With regard to claim 2, the Examiner again uses Radic as motivation to modify the routing devices to be substituted with interleavers.

With regard to claim 5, it is alleged that an optical transmission inherently includes a first optical transmitter/receiver, and a second optical transmitter/receiver unit. Again the Examiner relies on Radic to suggest use of interleavers to suppress coherent and incoherent crosstalk. Similar arguments are made to reject claim 6.

III. 35 U.S.C. §103(a) rejection of claims 3, 4 and 7:

The Examiner alleges that there is an admission in the instant application that dispersion compensation modules located adjacent to the amplifier module are well known in the art)Figs. 1 and 3 o f prior art, and page 3, line 14 through page 5, line 10. The Examiner alleges that it would have been obvious to modify the apparatus taught by Uno and Radic by including a dispersion compensation module adjacent to the optical amplifier to reduce accumulated signal dispersion.

Applicants' Traversal:**I. 35 U.S.C.§112:**

With regard to the rejection under 35 U.S.C.§112, second paragraph, claim 2 has been amended as suggested by the Examiner. Thus, Applicants respectfully submit that the amendment to claim 2 overcomes the 35 U.S.C.§112, 2nd paragraph rejection. Reconsideration and withdrawal of this ground of rejection are respectfully requested.

II and III: 35 U.S.C.§103(a):

It is respectfully submitted that none of the instant claims would have been obvious to a person of ordinary skill in the art in view of the combination of Uno and Radic, and/or Uno and Radic in view of alleged Admitted Prior Art.

As noted in the instant specification on page 8, lines 10-15, a drawback of conventional amplifiers is that there is a requirement of duplicated elements, particularly, optical amplifiers. The interleaved bi-directional loop shown in Radic has a total of four optical amplifiers OA_{W1}, OA_{W2}, OA_{E1}, and OA_{E2}.

Applicants respectfully but strongly disagree that an artisan would have found it obvious at the time of invention to: "modify the apparatus of Uno by substituting three port interleavers for the first and second wavelength routing elements in order to route interleaved forward and reverse propagating signals through the unidirectional amplifier in order to minimize four-wave mixing."

It is respectfully submitted that an artisan would not have found such suggestion because UNO does not normally operate as a bidirectional optical amplifier. The optical

amplifier shown in Fig. 5 of Uno was designed according to wavelength bandwidths as shown in Fig. 4 of the reference.

Assuming *arguendo*, if a person of ordinary skill in the art were to have substituted the first and second wavelength routing elements with first and second interleavers in the construction of the apparatus, for example, shown in Fig. 8 of Uno, (according to the alleged teachings of the combination Uno and Radic, and/or Uno, Radic and alleged admitted prior art) about half of the channels consisting of forward and reverse propagating signals would disappear. The reason is that each interleaver cannot separate the forward and reverse propagating signals having the wavelength bandwidths that are separated from each other (As shown in Fig. 4) due to their characteristics.

Therefore, it is respectfully submitted that it would have been impossible for a person of ordinary skill in the art to have found it obvious at the time of invention to substitute the first and second interleavers for the first and second wavelength routing elements in the construction of Uno, in view of the combinations of Uno and Radic, and/or Uno, Radic and alleged admitted prior art.

It is respectfully submitted that the combination or Radic and Uno fails to disclose or suggest limitation of the requirement of optical amplifiers used with interleaving units. For example, Uno is completely silent in this regard. Radic, on the other hand, discloses on the first page section 3 (Results and Decision) that interleaved bi-directional transmission generates large levels of coherent and incoherent cross talk at amplification nodes, which he illustrates at Fig. 2. Radic confirms this problem with bi-directional loops on page 2 when he states that "the loop architecture *necessarily* introduces an excessive

amount of loss that *needs to be overcome by an in-line amplifier ...*" (emphasis in Italics and boldface added). Radic uses four in-line amplifiers, OA's East 1 and 2, and OA's West 1 and 2 for the loop.

Accordingly, it is respectfully submitted that the combination of Uno and Radic would have failed to disclose, suggest, or motivate a person of ordinary skill in the art at the time of invention such that a reduction in the number of optical amplifiers used in an optical amplifier unit having interleavers would have been obvious from the teachings of the combination of references.

In addition, the Court of Appeals for the Federal Circuit has held that:

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.

In re Fritch, 973, F.2d 1260, 1266, 23 U.S.P.Q. 2d 1780, 1783-84 (Fed. Cir. 1992).

Here, the Office Action has not set forth a *prima facie* case of obviousness as the teachings of the combinations of Radic and Uno, and or Uno, Radic and alleged admitted prior art fail to disclose, suggest or provide motivation or the desirability to perform the modification.

Finally, Applicants respectfully submit that it was held by *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) that in order to establish a *prima facie* case of obviousness, three basic criteria must be met.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to

modify the reference or combine the reference teachings.

Second, there must be a reasonable expectation of success.

Third, the prior art reference must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art, and not based on Applicant's disclosure.

In particular, while Applicants respectfully submit that all three criteria are missing, that with particularly items two and three of the three basic criteria expressed in Vaeck cannot be met by the combination of references, as there would be no reasonable expectation of success, and Applicants respectfully submit that the teaching or suggestion to make the claimed combination and the reasonable expectation of success is not found in the prior art, and is in fact based on Applicant's disclosure.

Reconsideration and withdrawal of these grounds of rejection are respectfully requested.

Conclusion:

Accordingly, Applicants respectfully submit that all grounds of rejection with regard to claims 1-7 have been overcome, and are allowable at least for the reasons indicated above. A Notice of Allowance is respectfully requested.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to kindly contact the undersigned at the telephone number listed below. If there are any fees due and owing, please charge Deposit Account No. 502-470.

Respectfully submitted,

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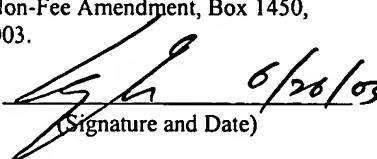
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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to the COMMISSIONER FOR PATENTS, Mail stop Non-Fee Amendment, Box 1450, Alexandria, Virginia 22313-1450 on June 26, 2003.

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6/26/03
(Signature and Date)